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# THE AGRICULTURAL STUDENT



J.S. MORRILL

N.S. TOWNSHEND.

A MONTHLY MAGAZINE DEVOTED TO  
AGRICULTURAL EDUCATION.

5 Cents per Copy.

50 Cents per Year.

# Convince Yourself!

**D**OES it ever occur to you that a practical demonstration of merit is worth more than the "tale of woe", which comes from a salesman with an "ax to grind." It is remarkable how wonderfully interested in the welfare of the creameryman (?) some wild-eyed competitors of the Tubular have become. Why are they so energetic in their efforts to prevent creamerymen from giving the Tubular a trial? Because they are trembling in their boots. Do they fear that the creameryman will be the loser? Oh, no! Because it is the last card they have to play and they know that when the Tubular is given a fair trial it gives satisfaction and proves itself in every way superior to their back-number machines. Some of these fellows have been weeping "crocodile tears" over Mr J. A. Chillqvist, of Nettle Creek, Illinois, but the following letter from this gentleman shows that it has paid him to use his own judgment rather than listen to false friends:

NETTLE CREEK, ILLINOIS, August 4, 1899.

THE SHARPLES CO., Chicago, Ill.:

Gentlemen - Your letter of inquiry of a recent date was duly received and should have been answered sooner but from the fact that I wished to see fully what the Tubular would do. I have now fully decided after carefully testing the machine, and am prepared to say that it meets fully your recommendation, and even more, as it requires very little power to operate same, and the cream is equal, and I believe superior, to any separator that I have ever used. I have used separators for the last fifteen years, including nearly all makes. Danish Weston was the first, then De Laval and Sharples, and also Alpha, all of which I considered good, but now I say from experience that I regard the Tubular Separator as the leading machine. I was warned against using or buying this, as it was an experiment; it has proved to me the right kind of an experiment. What can we expect unless we look to advancement. I am skimming 2,500 pounds per hour, and this not to exceed .03 to .05, and have always found that my own judgment has served me better than the talk of competitors, agents of separators, or anything else. There are several Tubulars running near me and all are more than pleased with results from their machines.

Yours truly,

J. A. CHILLQVIST.



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**P. M. SHARPLES,**  
West Chester, Pennsylvania,  
U. S. A.







WILLIAM O. THOMPSON, M. D., LL. D.

President Ohio State University.

(See page 3.)

# THE AGRICULTURAL STUDENT.

VOL. VI. OHIO STATE UNIVERSITY, COLUMBUS, SEPTEMBER, 1899. No. 1.

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## EDITORIAL CHAT.

With this issue a new management of the AGRICULTURAL STUDENT begins the coming year's work, and we will now proceed to a short definition of our plans for the coming school year.

While the efficient management of the outgoing administration has left us a high standard toward which to work, this standard we shall endeavor to maintain, for it demands that we make improvements wherever possible.

Each member of the staff will, as far as possible, have charge of some special line of work. In this way the results of all scientific investigation and original research that may be carried on at the University in all lines, but especially in agriculture, and allied branches, will be fully reported.

A representative from the course of Domestic Science has been added to the staff, and will report the work done in that department.

We wish to ask all friends of agricultural education for their co-operation during the coming year, and we trust we shall merit your good fellowship. We will make mistakes, but remember we are amateurs, not veterans, in the newspaper business. If you see where we can make improvements, kindly tell us and your suggestions will be gratefully considered.

Some of our readers may be interested in learning of the increase in number of students in the College of Agriculture, as shown by the following table:

Number of students, Ohio State University:

	College of Agriculture.	Entire University.
1890-91 .....	31	493
1891-92 .....	40	668
1892-93 .....	47	794
1893-94 .....	71	800
1894-95 .....	90	810
1895-96 .....	83	969
1896-97 .....	97	1019
1897-98 .....	144	1099
1898-99 .....	164	1147

This table furnishes a convincing answer to all who believe that agricultural education is being neglected at the University.

In only one year, 1895-96, has there been an actual loss in the number of students in the College of Agriculture, while in the years 1893-94, 1894-95 and 1897-98, over one-half of the increase in the entire University was in the College of Agriculture. The completion of Townshend Hall in 1897-98, no doubt accounts for the noticeable increase in that year.

With the facilities for instruction in agriculture and allied branches unexcelled, Ohio is in the van of agricultural education in the country. In no other



school can farmers give their boys and girls such a thorough scientific and practical education as at the Ohio State University.

The AGRICULTURAL STUDENT is published by the students of the Department of Agriculture and Domestic Science, and we wish all the students to feel that the paper is theirs. Take pride in the fact that ours is the only department in the University that maintains a paper of its own, and support it in every way possible. Not only subscribe for it at once, but consider it your privilege and duty to report anything of scientific interest. The benefit you will derive from the effort will more than pay you for your trouble.

And here we wish to request all ex-students and alumni to report things that may be of scientific interest that we may use them in our columns, in order that we all may profit by knowing them. Many of you are in a position to carry on valuable experimental work in various lines. It is especially requested that you report the results of such experiments, that we may publish them in connection with the work of the Agricultural Students' Union of Ohio.

We wish to call the attention of the students, especially the new ones, to Townshend Literary Society, which meets every Friday night in its beautiful room in Townshend Hall. Townshend was formerly a technical society, devoted to the discussion of topics pertaining strictly to agriculture. Last year, however, the constitution was changed, placing Townshend among the distinctly literary societies.

Townshend stands second to none in the quality of its work, and offers excellent advantages for literary training, so essential to a complete college education. Do not wait until your last year

before you join, but do so immediately and not only be benefited yourself, but give your support to the society.

### **The Experiment Station Ideal.**

This subject was intelligently and exhaustively treated by Prof. H. P. Armsby of Pennsylvania State College before the July meeting of the Association of Agricultural Colleges and Experiment Station Workers, held at San Francisco. Dr. Armsby said in part: The real problem of the station is not to put a mass of information, however valuable, into the hands of the farmer, but to strengthen his grasp on principles and his ability to apply them intelligently. In other words, it is an educational problem. The true field of work of the experiment station is the farmer's mind, not his acres. But the direct and obvious educational influence of the station on the farmer is of less importance, as it seems to me, than its indirect services, and it is to these that I especially wish to direct your thoughts.

We are evolving a variety of methods and appliances for agricultural education. Starting with the agricultural college, we are developing secondary agricultural education in our short courses and dairy courses, and the demand promises to outrun the supply. The movement for the introduction of the elements of agricultural science into the rural schools is gathering head, and the normal schools are already beginning to react to the demand for qualified teachers. Within the last 15 years the system of farmers' institutes has had a most phenomenal growth, and the attendance upon these schools of the farmer must be reckoned by the hundreds of thousands, if not millions. The reading and correspondence courses are making a rapid and apparently healthy growth, and if last not least, the agricultural



press has been almost revolutionized in its character within the last three decades, and has become a powerful instrument of agricultural education. Everywhere there is manifest the demand for more light. The farmers are awake; they are hungry and thirsty for knowledge.

This movement, once started, cannot go backward. I look forward confidently to the time when the agricultural college as we now know it will be but the capstone of a great system; to the time when the country boys and girls throughout their whole education, be it longer or shorter, from the kindergarten through the primary school and the secondary school to the college and the university, shall be trained in the observation of those processes of nature which surround them on every hand, but which now so largely appeal to eyes that see not and ears that hear not. When that time comes, when every rural school is a school of agriculture and its work is supplemented by the farmers' institute, the agricultural press and the home study course, when instead of counting our students of agriculture by the score or the hundred, we shall count them by the thousand or million, then we shall have risen to some adequate comprehension of the dimensions of this vast problem of agricultural education, and shall have made a long step toward solving the problem of rural discomfort by making farming an intellectual occupation.

But what shall all these people, young and old, be taught, and who shall teach it to them? Where shall we find the fountain from which shall flow the stream of knowledge and inspiration which shall fructify and vivify this vast system and prevent it from becoming simply a teaching machine and our teachers mere peddlers of knowledge? We shall find it

precisely where it is found in all systems of education; in that first-hand knowledge and familiarity with the subject which is gained by independent original investigation. That is, we shall find it in the experiment station. It is here that I see the high ideal and the great work of the experiment station. It is our agricultural university devoted to the advancement of learning; the promoter of investigation; the source not merely of knowledge, but of inspiration for the whole organism.—American Agriculturist.

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### The New President.

The new President, Dr. W. O. Thompson, was born in Guernsey county, O., and inherited all the advantages of poverty. He made his way through Muskinugum College with great difficulty and was obliged to interrupt his studies more than once to secure the means to complete the course. He took his bachelor's degree in 1878, ten years after his entrance. He entered upon a theological course, and was graduated in 1882, and engaged in home-mission work in Iowa and Colorado. In the latter State he became President of a small college, and was called in 1891 to take the Presidency of Miami University, where he has served the last eight years with distinction.

We cannot hope to add to the estimate placed upon Dr. Thompson's fitness for the position to which he has been called by the unanimous voice of the University board. His liberal culture, his sterling qualities as a man, and his fitness for the work are conceded by all who know him.

The farmers of the State will be glad to know that in Dr. Thompson they are sure of a helpful friend. Our new President is yet a young man, and not many years ago was working on a farm in

Licking county at moderate wages. His own experience teaches him to place little stress upon the necessity of wealth in the development of a healthy boy or girl.

Individual worth and real merit will always be recognized by him as advantages of greatest value. His acquaintance will be a delight and honor to us all, and the people of the State, as well as the University, are to be congratulated that Dr. Canfield's loss is to be so well retrieved.

### Does It Pay?

The following letter has been received by Professor Hunt from R. W. Dunlap, of the class of '95:

CONGO STOCK FARM,  
KINGSTON, O., Sept. 1, 1899.

Prof. Thos. F. Hunt, Columbus, O.:

MY DEAR PROF. HUNT—I take pleasure in answering your circular of August 10th.

The reference to students not returning to the farm after receiving an agricultural education is certainly incorrect, at least it is incorrect in so far as it pertains to students from the O. S. U. Instead of educating boys away from the farm by sending them to an agricultural college, I maintain it encourages and increases their desire to return to the farm.

Had it not been for my agricultural education received at the O. S. U. I am sure I would not have been upon the farm to-day. When I entered college I had no intention of making farming my life work, but for some reason, I do not now remember, I entered the agricultural course, expecting at the beginning of the next year to change to the scientific course. However, after having completed the first year in the agricultural course I found that there was something else to know about farming besides what I had learned in a practical

way while on the farm. After spending the summer on the farm and applying some things I had learned I came to the conclusion that I would try another year in the same course, thinking that if I did not care to return to the farm, after completing my course, perhaps I could teach. After I had completed my second year I concluded to give up the idea of teaching and prepare myself to farm.

It has now been three years since I graduated and began farming, and in that short time I have found that my agricultural education has been of very great value to me in every way. After learning "why" certain things should be done, it is much more pleasant to do them intelligently than to do them merely because we know they must be done to obtain the desired result. If I were to have my education over again I would most emphatically choose the same course.

You ask what success I am having in my business, etc. I can say that I now have charge of a 250 acre farm and have had good crops in the past three years. Not only have I received good crops, but in this short time have got together some first-class horses and a few good short-horn cattle.

The enclosed clipping will show what results I had at the Ross County Fair, held at Chillicothe last month. The show in sweepstakes for best cow, which I won, I consider worth something more than ordinary attention, for in this show I was in competition with some very high priced Red Polled cows, bred by Mr. Hills, of Delaware, O.:

### YARDS OF RIBBON.

"Mr. Renick Dunlap brought to the county fair from the Congo Stock Farm at Kingston a string of horses and a collection of short horn cattle which took a bolt of red and blue to supply with pre-

miums, the judges finding that in all classes Mr. Dunlap had flesh and blood, which had developed into undisputed prize winners.

Owing to the amount of show stock exhibited, particularly in the horse and cattle line, it took the best in the market to draw a colored ribbon, but Mr. Dunlap had the quality which demanded rewards, as the list of premiums he drew bears evidence.

In the general purpose class he got first premium for the best three-year-old mare, first and second for the best mare two years old, first for the best gelding two years old, and second premium for a match team of draft mares.

In the draft line, his Percheron stallion, "Uncle," was awarded first premium as the best two-year-old native stallion. Uncle is out of Coley, by Conquerant, and tips the beam at 1275. Coley, the stallion's dam, was awarded first premium for the best brood mare of four years or over, and also the sweepstakes prize. In this same class Mr. Dunlap got first and second premiums on one year old stallions, second for best brood mare with foal by her side, second for mare two years old, and first premiums for geldings two and three years old.

First premium was awarded him for the best spring colt in the roadster class.

In the cattle line he got first premiums on the following: Best yearling bull, best cow of two and three years, and best heifer calf. In the sweepstakes awarded yesterday morning, Mr. Dunlap got the prize for the best cow shown."

In a political way I have been elected Secretary of the Republican Central Committee of my county, and am also a member of the Executive Committee. I was President of the County Farmers' Institute last year and re-elected again for this year. I am also Secretary of the Ross County Pomona Grange.

No doubt I have given you more information concerning my welfare than you desired, but possibly you can pick out what you want and discard the balance.

Yours truly,

R. W. DUNLAP.

Mr. Dunlap graduated in the class of '95, and his many friends will be glad to hear of his success in his chosen work.

The above letter verifies, in strongest terms, the statements made by Professor Hunt elsewhere in this paper. Those people who persist in making the statement that the agricultural colleges are taking the boys away from the farm, would do well to inform themselves of the facts in the case as set forth in this letter and the article by Professor Hunt.

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### **The 48th Annual Meeting of the American Association for the Advancement of Science, August 18-26, 1899.**

This meeting marks another year point in the history of the society, which, probably more than any other organized body, has had its share in placing the United States in the van of nations for scientific progress and research. This, too, in a century which has given more valuable discoveries to the world than all the combined centuries gone before.

The real work of the Association began Tuesday morning, August 22, after all the preliminaries had been disposed of, and several of the affiliated societies had adjourned. Nine regular sections began the reading of papers, early in the morning, and continued in daily session until the meeting was ended.

A beautiful feature of the meeting was the observation of Sullivant day by the botanical section, in memory of Professor William S. Sullivant, who died about 26 years ago. He was one of the



most distinguished botanist in the country and possibly the greatest living authority on mosses. His ample fortune was expended in the publication of his own works and the fostering of botanical knowledge generally.

Liberal provision was made by the local committees for the recreation and entertainment of the visitors. Besides numerous receptions and local excursions, free excursions were tendered the members of the Association to various points of scientific interest all over the State.

The societies affiliated with the American Association, and which held their annual meetings in conjunction with it, were the Society for the promotion of Engineering Education, the Association for the Advancement of Agricultural Science, the Botanical Society of America, the Society of Economic Entomologists, the Microscopical Society, the American Forestry Association, the Geological Society of America, the American Chemical Society, the American Mathematical Society, and the American Folk Lore Society.

The meetings of the American Association, as well as those of the affiliated societies, were the most successful in the history of the Association. Many papers were read which were notable in themselves and in their authors. They were the results of painstaking experiments and profound thought during a year of scientific labor.

The University has every reason to feel congratulated in having the honor of entertaining such a splendid gathering of learned and famous men, and also in the fact that we have Dr. Orton as President of the Association.

Mr. B. M. Pierce, after taking two years of work in the agricultural course, is now Mr. Imes' assistant at Dover, N. H.

## **Society for the Promotion of Agricultural Science.**

The twentieth annual meeting of this society was held in Columbus, on August 18 and 19, 1899. The sessions were held in Townshend Hall and began at 8:30 a. m. on Friday, the 19th. The executive session for the election of officers and the transaction of miscellaneous business was held on Friday night.

The following papers were read at this meeting, but not necessarily in the order named:

B. D. Halsted, President's address—"Experience notes upon pot experiments."

W. J. Beal—"The vitality of seeds buried in soil for 20 years."

Harry Snyder (by invitation)—"Soil investigations."

F. M. Webster—"Some suggestions relative to life zones."

D. G. Fairchild (by invitation)—"A new competitor in the fruit trade."

H. C. Irish—"New Zealand spinach as a garden crop."

F. C. Stewart (by invitation)—"A bacterial rot of onions."

C. E. Bessey—"The passing of the Russian thistle."

Herman Von Schrenk and H. C. Irish—"Experiments to determine the amount of water used by crops."

C. E. Bessey—"Observation on Buffalo grass."

H. L. Bolley—"The destruction of weeds in cereal crops by the use of chemicals sprayed upon the foliage."

John B. Smith—"Crude petroleum as an insecticide."

Herbert Osborn—"Notes on geographic distribution of injurious Hemiptera."

Wm. Saunders—"Economy in the use of barn-yard manure."

Wm. R. Lazenby—"Honey bees as pollinators of fruit."

Wm. Saunders—"Results obtained from cross fertilizing of cereals."

A. D. Hopkins—"Special varieties of timothy."

Wm. R. Lazenby—"Observations on the temperature of forest trees and wood lands."

V. H. Moore—"The bacterial invasion of the udder a source of milk infection."

These are the officers elected: President, W. J. Beal, Agricultural College, Mich.; Secretary-Treasurer, T. F. Hunt, Ohio State University; third member of Executive Committee, C. S. Plumb, Perdue University.

Secretary of Agriculture James Wilson was elected an honorary member, and the following named gentlemen were given membership: F. C. Stewart, Geneva Experiment Station; W. M. Munson, Maine State College; M. V. Slingerland, Cornell Experiment Station, Ithaca, N. Y.; Robert H. Longhedge, University of California; J. B. Lindsay, Massachusetts Agricultural College; Harry Snyder, Minnesota School of Agriculture; D. S. Fairchilds, Department of Agriculture, Washington, D. C.; W. G. Johnston, College Park, Md.

### Occupation of Former Students.

It is not at all unusual to see the charge made that agricultural colleges are taking young men away from the farm. These statements are made so frequently and usually in such an irresponsible way that it is not worth while to answer them; but when a man of the standing of George T. Powell makes the statement in a purported interview with the editor of the Rural New Yorker that proper agricultural education "cannot be obtained in any agricultural college, for the college is fitting and making teachers and that evidently takes young

men away from the farm," it is time the statement was sat upon and sat upon hard.

I take the Ohio State University as an illustration of the supposed influences that agricultural colleges exert, merely because I have the information at hand.

Since January 1, 1892, 453 students have been connected with the College of Agriculture and Domestic Science of the Ohio State University. Of this number 149 are still students, fourteen of them being in other courses or colleges. There are 106 ex-students of whom we do not at present have any knowledge. This leaves then 200 ex-students about whom we have fairly definite information as to their occupation during the past two years. What are these people doing? There are 80 farmers, 40 cheese makers and butter makers, 28 are farm foremen or farm employes of more or less responsibility, while ten are teachers in agricultural colleges. Seven young men were in the Spanish-American war, while eleven of the 200 ex-students are young women who have been pursuing the course in Domestic Science (recently established). One has become a lawyer, one a physician, while one is a member of an agricultural newspaper firm. There are two druggists and two veterinarians. Two have died. Six are holding clerkships, while six are in miscellaneous occupations.

Are these young people being educated away from the farm with frightful rapidity? Of the 106 ex-students, of whom we do not have any information, it perhaps should be stated that many of them were students only a portion of one year and were not here long enough to be counted seriously, perhaps, as students of the college. Every one that has had to do with college students knows that the "mortality" among students the first year is always large. There is just

as much reason to believe, however, that these young men are farmers as that they are anything else.

Of the 300 students above mentioned who have apparently ended their college days, 29, or about ten per cent. (not including the present senior class), have graduated in the four-year course in Agriculture or Horticulture and Forestry. What have they been doing during the past year? Eleven have been farming or gardening; seven have been teachers or assistants in agricultural colleges; two have been farming for others; two are preparing to become physicians; and two have been clerks; one is curator of the Archeological Museum; one a creamery operator; one a post-graduate student; one was in the Spanish-American war, and the employment of one is at present unknown.

Doubtless these figures are rather tedious, but to the person who is open-minded are they not rather astonishing? Do the graduates of other technical schools show any higher proportion of the students following the calling for which they are educated? Neither are these figures unique. I am quite sure, Mr. Managing Editor, that your own alma mater can show equally interesting and conclusive results. Will you not have them brought to the attention of your readers?

It goes without saying that if students go or are sent by their parents to a University to study some other of the many excellent courses which are taught in the State Universities, it is not to be expected they will return to the farm. These figures simply show that a man who is in earnest about having his son become a farmer can safely allow him to pursue a course in agriculture in an agricultural college.

THOMAS F. HUNT.

### Personal Notes.

Mr. Homer C. Price, who graduated in the class of '97, has been elected to the position of Assistant in Horticulture, vacated by John F. Cunningham. Mr. Price held the Fellowship in Agriculture at Cornell in 1898-99, receiving his Master's degree with the class of '99. He is a fine student in several lines of work and in every way fitted for the place.

Of the class of '99, from the College of Agriculture, we have the following at hand: Oscar Erf has been appointed Instructor in Dairying at the University of Illinois; F. S. Johnston is Assistant Professor of Agriculture in the New Hampshire State College; Marion Imes is located at Dover, N. H., where he is superintendent of a dairy containing over 100 cows; A. G. Abbott is in the employ of Mr. H. S. Watson, Kearney, Neb., as foreman of an 8000 acre dairy farm, (it is a significant fact that Mr. Watson considered no applicant unless he was a college trained man); L. C. Warden is in the employ of the Railway Manifoldng, Chicago, Ill.

Mr. W. R. Beattie, '94, B. Sc., '97 M. Sc. (in horticulture), has been appointed Assistant in the Section of Seed and Plant Introduction, of the Division of Botany, of the United States Department of Agriculture, Washington, D. C.

John F. Cunningham, '97, B. Sc., '99 M. Sc. (in horticulture), former Assistant in Horticulture, has accepted the Assistant Editorship of the "Ohio Farmer," and is now located at Cleveland, O.

### The Ohio State Fair.

The forty-ninth annual Ohio State Fair held September 4 to 8 inclusive, was one of the most successful exhibitions, both from a financial and educational point of view, that has ever been held on the State Fair Grounds. The buildings for the display of fine arts



were crowded to their utmost capacity. The visitor met something new and instructive at every turn, and the large crowds that slowly passed back and forth through the wide aisles, fully appreciated these beautiful and instructive displays.

The large halls set aside for the display of agricultural products had every foot of available space taken up by splendid county and individual exhibits. The best county display of agricultural products was made by Union county. Warren, Licking and Lorain counties also presented fine displays indicative of their agricultural wealth.

The machinery exhibits were large and extensive. Almost every known field of agriculture was suggested by one exhibit or another. The exhibit of dairy machinery was large and interesting to those who are identified with the dairy interest of the State.

From the machinery department one naturally turns toward the large live stock exposition buildings. The State Agricultural Board has erected three large buildings for the accommodation of cattle, sheep and swine. They have also made some much-needed additions to the poultry department. The cattle, sheep and swine buildings are built in the form of a square. The cattle building accommodates 628 head. In the center of the square is a large show ring with a large amphitheater on each side, where the spectators have a full view of the show ring below.

Here admirers of all classes of live stock could feast their eyes, for noted herds of all breeds and classes of cattle, sheep and swine were pitted against each other in friendly and instructive competition.

For the first time the Polled Jerseys were given a class of their own, and the large exhibit in this class confirms this action of the Board.

Our friends, W. B. Smith & Son, were on hand with their excellent herd of Hol-

steins. Mr. Smith not only won sixteen out of nineteen shows, but also won the Grand Sweepstakes Prize for aged cow in the dairy class. The famous cow, Annual, belonging to this herd, won Grand Championship Prize for the best milk and butter cow.

The exhibits of horses of all classes were fully up to the standard, and the races were of unusual interest.

That exhibitors in every line appreciated the accommodations at the Ohio State Fair is evidenced by the constant increase in number and quality of exhibits.

### **The American Forestry Association.**

The annual meeting of this society was held in Horticultural Hall, August 22 and 23, 1899, under the auspices of the Columbus Horticultural Society. The sessions began at 2 p. m. Tuesday, and after the usual announcements and reports of committees the following program was rendered:

Address—"Past and Future Work of the Ohio Forestry Bureau,"

Rev. James Poindexter

Paper—"Observations upon the Woodlands of Ohio,"

John F. Cunningham

Wednesday, August 23.

Paper—"Natural Regeneration of Forests on Old Fields in Eastern Kentucky".....Prof. S. C. Mason

Discussion—"Some Relations between Meteorology and Forestry,"

Opened by J. Warren Smith

Paper—"Lumbering in Northern Michigan".....Dr. W. J. Beal

Address—"Some of the Chemical Products of Wood" (with illustrations),

N. L. Burner

Paper—"The Rate of Growth and Temperature of Various Varieties of Forest Trees,"

William R. Lazenby

The trees on the campus were visited, and the University collections of native Ohio woods were inspected. A short excursion was also taken to view some of the trees bordering the Olentangy River.

### **Post Mortem of Tuberculous Guinea Pigs.**

On April 11th eight guinea pigs were inoculated with tuberculous matter taken from cattle killed at Wooster experiment station, with the hope of verifying the conclusions drawn at that time. These little animals were carried in a basket to Wooster and back and all survived the trip and lived until killed on June 1st. The inoculation was made directly into the peritoneal cavity, with an ordinary hypodermic syringe, the material being dissolved in distilled water. Six were inoculated with cheesy matter taken from abscesses in different glands of the cattle slaughtered. None of the guinea pigs had at any time from the 11th of April until they were killed, showed any symptoms of ill health, and were fat and in splendid condition at time of killing. They were kept under observation all the time, being fed regularly. They were confined in a pen next to one containing a lot of guinea pigs which had not been inoculated and they appeared to do fully as well. Of the six inoculated with undoubted tubercular abscesses, all were badly affected with the disease. Five of them had large tubercular abscesses at the point of inoculation. In every case the tubercular lesions were well marked in the pancreas, that organ being filled with caseous and calcified abscesses. In almost every case the spleen was more or less affected as were the portal lymph glands of the liver. In only one or two cases were the lungs affected, but had the animals lived longer it is altogether probable that every organ in the body would have become affected. Two of the pigs were inoculated with the green caseous matter taken from the small nodules found throughout the small bowels of animal No. 12. There was some doubt as to whether or not this was tubercu-

lous, some of the veterinarians present holding that this was a nodular disease produced by parasites, others maintaining that it was tuberculosis. No lesions whatever was found in these last two guinea pigs and in view of the well-marked lesions found in the other cases it is at least reasonable to suppose that the Holstein cow No. 12 was not tuberculous, although reacting to tuberculein test.

On the whole the experiment was very satisfactory and the result very gratifying. It demonstrated very nicely the susceptibility of the guinea pig to tuberculosis. It further showed that the bacilli of tuberculosis contained in the old encapsuled abscesses, were still virulent. That had never been satisfactorily demonstrated before. It would have been interesting to have let a number of the pigs lived until an advanced stage of the disease was reached, and to have noted carefully the symptoms, but the close of the school year rendered that impossible. A number of guinea pigs are still kept at the Veterinary Department and if opportunity presents they will be inoculated with tuberculous or some infectious disease and the results will be duly published in the AGRICULTURAL STUDENT.

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### **The Passing of the Russian Thistle.**

Read before the Association for the Advancement of Agricultural Science, by Charles E. Bessey, Chancellor of University of Nebraska:

A decade or more ago, the people of the West were frightened because of the appearance of a new weed which they called the Russian thistle in their "breakings" and fields with partly occupied surface. For some years the experiment stations issued bulletins which were filled with more or less sensational matter descriptive of the structure, habits and

probable future history of this new comer. State legislatures were besought to pass stringent laws to prevent its spread, and severe penalties were imposed upon certain officers for failure to exterminate the dreaded pests. When the tide of fear ran highest, Congress was besought to appropriate huge sums of money for the purpose of fighting this plant which was thought to be menacing the prosperity of the nation. It was a curious, but unfortunately not a solitary case of a panic, a sort of epidemic which swept over the middle west, with sporadic cases outside of the region of serious outbreak. If instead of writing of the Russian thistle in this paper, I were discussing this epidemic of fear, I should propose the name "Salsolophobia" as a fit term for it, and should offer it as a contribution to that curious department of human inquiry in which attention is given to the delusions, hallucinations, crazes, manias, and other emotional epidemics which from time to time take possession of communities.

But I am not particularly interested in this phase of the Russian thistle, but have been much interested in watching this plant as it has come into the plant communities on the Central Plains. On its first appearance it occupied the "breakings" where the farmer had broken up the tough sod, and hard ground, and allowed it to lie idle for a year or so until the grass roots had rotted sufficiently to enable him to begin cultivation. Here the Russian thistle grew upon the virgin soil with no competition with other plants, and small wonder that the results were astonishing. The farmer finding a new kind of plant on his "breakings,"—round topped, stiff and very prickly,—was naturally somewhat troubled in mind, and this perturbation quickly passed into alarm when he found these sinister plants

unfastening themselves and rolling like things possessed of evil spirits across the plains. And when the strong winds of autumn began to bring these uncanny tumble weeds in great numbers from other breakings far to windward—alarm passed into panic and the farmer's hands fell down in helpless terror, and his voice went up in entreaty to the legislative halls for a law to lay this evil thing and banish it from the land. I wish I could say that the doctors and teachers—duly appointed by governing boards to be the official investigators of the plants which pester the people, tried to allay the excitement of the panic stricken communities. It was, however, as it has always been; those who should have led the people away from their fears into quieter and saner mood, were swept along by the excitement, and became themselves contributors to the frenzy. Bulletins appeared in rapid succession from the learned doctors in the experiment stations, articles were published in the agricultural press written by still more learned teachers, all setting forth in more or less startling style every structural detail with half-tone reproductions of the terrible wonder, Salsola, in various stages, ages and attitudes, from the black snake-like weed, to the wild mannered but innately evil seedling, and full grown, grisly, prickly, rolling, tumbling thing of the autumn and winter. As Aaron himself, in the old story, went with the idolatrous people, as lawyers, teachers, and ministers went with the frenzied people during the witchcraft craze, so in this case, those who should have helped the people to a calmer view were too often themselves the leaders in propagating the excitement.

The people themselves began to realize that they were frightened unduly, and as they passed into a calmer mood,



they rid themselves of the "Blue laws" for which they had clamored in their fear. To-day as one travels over the Nebraska plains he finds the Salsola as a common wayside weed, small, slender and generally unnoticed. On the farms it is common, but of so little importance as neither to demand or receive especial attention. Now and then a plant may be found which comes up to the dimensions of the "half-tone" illustrations of the bulletins, but these are rare, so rare that one has to search long for a good specimen fully as long as when on its first appearance the largest and most formidable specimens were sought out as fit subjects for photographing.

In a recent journey of nearly a thousand miles in Nebraska, including a broad belt of counties from those touching the Missouri River on the east, to the Wyoming line on the west, I found that everywhere the Russian thistle is of relatively much less importance than formerly. It is a weed, no doubt of that, but it is one which finds little opportunity for troublesome growth on ordinary farms. On fallow ground it still grows large, and assumes a spherical form, but ordinarily it is low and slender. Many farmers and ranchmen esteem it highly as a fodder plant when fed early, and many cut it early and make it into nutritious hay. The day may yet come when the sheep growers of the plains will take pains to grow the Russian thistle as a fodder plant.

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### Insects in Stored Grain.

We are hearing serious complaints, from various parts of the country, regarding serious injury to stored grains by various insects. It might be well to note a few things in regard to these pests, and how they may be successfully fought. This enemy to stored grain is becoming of more importance each year.

Some two score species of insects have been found to be injurious to stored grain. These are mainly of two classes—moths and weevils. All of these species have been introduced from Europe, and the fact that they live continuously from year to year in the same grain, makes their distribution very easy.

The ravages of these insects cause a serious loss in weight, render the grain, in some cases, unfit for human food, and, where badly infested, for animal food also (except poultry). They further render the grain unfit for seed.

The ravages of these insects have been much greater in the southern portions of the United States than in the northern, but they are rapidly traveling northward.

To give some idea of the damage done by these insects, it has been estimated that in the State of Texas alone there is an annual loss of \$1,000,000 from their ravages, and that nearly 40 per cent. of the corn in the State is destroyed by the same cause. In 1895, the loss to the Alabama corn crop alone was estimated at over \$1,500,000.

All kinds of stored grains and seeds are subject to attack by one or more of these insects, but the chief injury is to wheat, corn, oats, barley, rye, rice and their dry products.

### REMEDIES.

The measures to be observed in the control of insects in stored grain are both preventive and remedial. There is no weevil proof grain. Unhusked rice, oats and buckwheat are practically exempt, but unhulled barley does not escape. The soft varieties of wheat are greatly preferred. Corn is less susceptible to attack by all insects, except the Anguimoid moth, when in the ear. In short, all husked, shelled or hulled grain is more susceptible to attack than before.

One or two of the species attack the grain in the field and it is impossible to prevent it. Still all but a very small per cent. of the damage may be prevented by harvesting as soon as ripe and threshing as soon afterward as possible.

Care should be taken that the grain should not be re-infested after threshing by putting in infested bins. The doors and windows of the granary should fit tightly to prevent the moths inside from passing out, and those outside from passing in. All bins should be thoroughly cleaned before fresh grain is stored in them. Storing in large bulk is a good practice, as the surface layers only are exposed to infestation. Stirring the grain is very beneficial where infested with moths, as they are unable to extricate themselves. But when infested with weevil, stirring only serves to infest the grain deeper.

The insects were formerly killed by the use of heat, a temperature of 130°-140° F. being sufficient to kill all insects in the grain. A low temperature is equally destructive. The simplest, most effective and cheapest remedy for these insects, however, is the bisulphide of carbon, a colorless liquid, with a strong disagreeable odor and a powerful poison. The most effective method of application is to pour in shallow pans and distribute over the surface of the bins. The liquid rapidly volatilizes and being heavier than air descends through the whole mass of grain, killing all animal life as it goes. The rate of application is about a pound and one-half to a ton of grain in tight bins, and more where open. The grain should be exposed for 24 hours. Bisulphide of carbon can be bought at any drug store at from 20 to 30 cents per pound, so it is easily within the reach of all.

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It is often better to be silent than sarcastic.

### **Method of Preparing, Use and Result of Starter.**

In butter making starters are used to control and hasten the process of ripening the cream. One of the most simple is the sour cream starter. In preparing this kind, all that is necessary is to save ripened cream from one day to another. (The amount to save is estimated by the butter maker. He tries to save enough to get the cream ripened by churning time.)

I have heard of leaving some of the sour cream in the vat and letting the new cream run in with it. This method has at least one thing to recommend it—the cream vat will not have to be washed. The buttermilk starter is prepared and used the same as the sour cream starter. Ordinarily these are used when it takes too long to get the cream properly ripened.

Another kind of the home-made starters is the milk starter. In preparing this, great care is used in selecting the milk. The milk from a fresh cow is preferred. (A creamery man would select a patron's milk who has the reputation of being extraordinarily careful. It is usually recommended to pay him a little extra, that he may use still more care.) After the milk has been selected, it is held at 85 degrees Fahrenheit, until it has become well lobbered. Usually, at this stage, bad odors may be detected. In case the starter is foul, the ripened cream of the previous day may be used until a more perfect milk starter can be made. It is considered best to prepare a fresh starter for each day. Buttermilk or sour cream may be used, providing a fresh milk starter is used once or twice a week.

Mr. John Boyd, of Chicago, has invented and holds a patent on a complete apparatus and on the process he uses. In the main, the apparatus consists of a

fermenting can, in which the fresh starter or lactic ferment is made, and a cream ripening vat with a cooling attachment. In this process, the lactic ferment is made from selected skimmed milk. The fermenting can is made so that the temperature may be easily controlled, which is a very important consideration in making the milk starter. His ripening vat is also well insulated, which aids in holding the cream at the proper temperature. To any one who wishes to use the milk starter, this set of apparatus will be of great help.

For a long time it has been known that the active agents in ripening cream are bacteria, yeasts and molds. These organisms bring about the ripening of the cream by breaking down the more complex chemical compounds of the cream.

For example, the butyric acid of the butter fat is set free by some, by others the milk sugar is changed into lactic acid, and carbonic acid gas is given off. Alcohol is also a common product, so much so that the butter flavor has sometimes been attributed to this product alone. In my experience I have noticed ripened cream that had a fruity odor similar to some of the alcohols. The decomposition products of albumen are numerous.

These bacteriological facts have led some of our bacteriologists to make investigations with a view of getting cultures of bacteria which would produce the proper flavor in butter made from cream ripened by the cultures inoculated.

The honor of having first introduced cultures in butter making belongs to Dr. V. Storch, of Copenhagen. His work was published in 1890. Other men have worked along the same line, both in this country and abroad, with the result that a large proportion of the

creameries in Northern Europe use commercial cultures for ripening cream. In this country their use is common, and is rapidly spreading. Some of our bacteriologists have sought for a purer culture, that would give a proper flavor to butter. A pure culture is one that contains only one specie of bacteria. An example of this kind of culture is found in Conn's Bacillus No. 41. Other men have gotten together a number of species which are claimed to ripen cream, so that the proper flavor will be conveyed to the butter. In a commercial way, these starters appear in various forms. Some of them are sold in the shape of a powder. At one time Conn's Bacillus No. 41 was sent out in the form of a pasty pellet. Another kind is sent out in a liquid form.

That an idea may be given of the amount of labor the use of the commercial necessities, I give in full the directions sent with one of them. In general, it is the same for all. Those given with the O. Douglass butter culture are about as follows: First, thoroughly sterilize a milk can. For the 1-ounce bottle of culture use eight quarts of new whole milk or fresh separator skim milk. Heat the milk in a previously cleansed can to 165 degrees Fahrenheit by surrounding it with boiling water, hold at that temperature for twenty minutes, stirring frequently to equalize the temperature. Cool rapidly by placing the can in cold water, stirring as before until the milk is 90 degrees Fahrenheit. Then remove the cork from the bottle of culture and pour the contents into the milk. Cover with clean paper and keep at a temperature of from 65 to 70 degrees. Stir occasionally with a spoon rinsed with boiling water. In from 36 to 48 hours the starter thus prepared should be of the consistency of thin cream.



To ripen cream, add the starter you have prepared to 20 gallons of cream and ripen at a temperature of from 60 degrees to 65 degrees, until ready to churn.

To maintain the culture by means of buttermilk, save a little over 10 per cent. of the buttermilk for starter for the next batch of cream, adding it in a proportion of one gallon of buttermilk to each ten or fifteen gallons of cream, as soon as you commence separating. Or, if for gathered cream, as soon as the cream arrives at the factory. A new starter from a new bottle of the culture should be prepared at least once each week.

Maintaining the culture by means of fresh starter each day: The most uniform results are obtained by using a fresh starter each day and they, therefore, recommend this method, where practical, instead of maintaining the culture by means of buttermilk. In using the fresh starter, each day add the ripened starter to 20 gallons freshly pasteurized and cooled milk, skimmed or whole. Allow this to ripen and use one gallon as a starter to each 10 or 15 gallons of cream to be ripened. Save enough of the starter, however, for the preparation of more starters for use next day, and so continue until a new culture is introduced.

Facts to be noted in the use of this culture: In order to maintain the culture in a state of purity, absolute cleanliness is to be observed in the creamery, and all the utensils should be cleansed with boiling water or by live steam as often as possible. If your starter does not appear as it should—for example, if it separates into cheesy curd and whey, or there are gas bubbles formed, etc., the fault in most cases is due to improper pasteurization of the milk or the milk itself was not fresh enough before pasteurization.

#### CAUTION.

The contents of the bottle must be used immediately after the cork is once drawn, otherwise the culture is liable to be worse than useless. Keep the bottle of culture as received in a refrigerator and away from a strong light, and use it at least within a day or two after it arrives, in order that you may get the most good from it possible, as it deteriorates if kept in the bottle any length of time.

In using commercial starters, it should be remembered that some of them are prepared for a special purpose.

For example, Conn's *Bacillus* No. 41 has been put forward as a culture which will produce aroma without the production of acid. Now, if this be true, it would be folly for a butter maker who has a trade for pasteurized sour cream butter to satisfy his trade by using Conn's *Bacillus* No. 41, as it makes no claim to produce sour cream butter from pasteurized cream.

The O. Douglass Company manufactures three distinct cultures. One is made for ripening ordinary cream, another for pasteurized cream, and still another for cheese. The Christian Hansen Company manufactures one that is claimed to be adapted to all three purposes.

As to sour cream and buttermilk starters, the verdict of most careful butter makers is that they are unreliable. The skim milk or whole milk starter has been recommended by some of our best authorities. As to the result of the use of the commercial starter, I shall have to confess that I am at a loss to know what to say. Some people who are using them have the greatest faith in their efficiency. Others who have used them are not quite so sure they do all that is claimed for them. If one depends upon experiment station bulletins to know

what to do, he would still be unable to decide, as there seems to be a lack of uniformity in their results. In most cases where the commercial starters have been used in careful experiments there seems to be a tendency toward better flavor in the butter made with their use. Another argument in favor of the commercial starters is that they produce a more uniform article.

In cheese making starters are used to save time and control the acidity of the milk. There seems to be good results obtained from the use of starters in cheese making. The preparation and use is about the same as for ripening of cream. Great care must be taken not to add too much, as the result will be a sour cheese.

#### FARM AND DAIRY BUILDING.

In farm dairy practice a room should be devoted for this work entirely; it need not be large nor elaborate, but it can not be associated with the kitchen or vegetables without injuring the product made.

In constructing such a building such pains should be taken as in erecting a creamery. If the cream is raised by the gravity process the building should be placed away from all other occupations, well lighted, well ventilated and reasonably cool. If cream is separated by the centrifugal process the milk may be separated in a neat room adjoining the stable, and only the cream need to be carried to the dairy proper.

This plan has several advantages. It saves the laborer carrying the milk to the dairy, also saves carrying the skim milk back again, and requires a much smaller dairy room. A disadvantage in a small dairy is the absence of steam for cleaning utensils, yet there are many advantages in farm dairying to offset this one. And where the plan is run on a large scale, the utensils and building

necessary are equal to those of a small creamery. With proper precautions and good management it can make the highest quality of butter or cheese.

OSCAR ERF.

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#### The Vitality of Seeds Twenty Years in the Soil.

Read before the Association for the Advancement of Agricultural Science, by W. J. Beal, of Michigan Agricultural College.

In the summer of 1879, twenty years ago, I buried seeds as follows: Twenty lots, fifty seeds in each, of twenty-two species of plants, mostly weeds. Each lot of seeds, with one exception, was well mixed with damp sand dug up from three feet below the surface and placed in an eight-ounce bottle. The seeds were well mixed in the sand, the bottle left uncorked and placed with the mouth standing downwards, buried twenty inches below the surface of the ground in a sandy knoll. The acorns were not placed in bottles. At the end of five years, at the end of ten years, at the end of fifteen years, and now at the end of twenty years sets of these seeds were tested for vitality and the results given at meetings of this society. In all cases, the results have been indefinite and far from satisfactory. I mean by this, that I have never felt certain that I had caused all of the sound seeds to germinate. I moisten the sand containing the seeds and forthwith a goodly number germinate and then they come slowly straggling along. I dry the soil and wait a few days, and after moistening in a few days, more seeds germinate. In two of the former tests, I dug the sand in spring or early summer and kept it about till the next November, removing the growing specimens from time to time; then the dry sand was set away till the next spring, when it was brought again and

moistened. A nice lot of seeds germinated. Why was I unable to induce them to start, when treated to various degrees of temperature and moisture for seven months?

We see this important point; it is to the advantage of the plants not to shoot up all of their seeds at one time, but to retain a good portion alive in the soil to be ready for stocking the earth on successive years.

Again, we must consider that it makes very little difference whether all the seeds live over for a time or only a small proportion of these that were produced, as a living seed now and then left is enough to save the starts and produce new crops of seeds.

These were the seeds buried :

Germinated.

Agrostemma Githago L. (Corn Cockle) .....	0
Amaranthus retroflexus L. (A pig-weed) .....	4
Ambrosia artemisiæfolia L. (Rag-weed) .....	0
Anthemis Cotula L. (Mayweed)..	0
Brassica nigra (L.) Koch (Black Mustard) .....	9
Bromas secalinas L. (Black Mustard) .....	0
Bursa Bursa-pastoris (L.) Britton (Shepherd's Purse) .....	21
Echamæraphis glauca (L.) Kuntze (Pigeon Grass) .....	0
Erechtites hieracifolia (L.) Raf...	0
Euphorbia maculata L. (Spotted Spurge) .....	0
Lapidium Virginicum L. (Wild Peppergrass) .....	29
Malva rotundifolia L. (Mallow)...	
Onagra biennis (L.) Scop (Evening Primrose) .....	14
Plantago major L. (Broad-leaved Plantain) .....	0
Polygonum Hydropiper L. (Smart weed) .....	1
Portulace oleracea (L.) (Purselane)	

Germinated.

Imercus rubra .....	0
Rumex crispus L. (Narrow-leaved Dock) .....	8
Stellaria media Cyr. (Chickweed).	3
Thuja occidentalis L. (Arbor Vitæ) .....	0
Trifolium repens L. (White Clover)	
Verbascum Thapsus L. (Mullen).	16

I began to test these seeds on the 4th of July and continued to the 16th of August. I expect to record many more in this list. The figures here given for germinating seeds are still far from incomplete.

On investigations of the fifth year, I found the acorns all dead and decayed. In all the tests made so, no seeds of the common cockle has germinated, nor the common chero, nor the fire weed, nor the arbor vitæ.

In case of the Shepherd's Purse and Pepper Grass, in some cases there was doubt as to which seedling was gained, but there were surely some of each.

### A Study of Grasses.

The plants from which we derive practically all of our hay and pasture belong to one of two families: Gramineæ or Leguminosæ. The first family includes all the grasses and either directly or indirectly may be considered the source of the food supply of the world.

We shall consider a few of the species, cultivated especially for hay and pasture, and compare their value and adaptability to various conditions of soils and climate.

*Agrostis vulgaris* (Red Top).

This is a perennial grass growing two to three feet high. The creeping root stalks form a very dense sod. It grows over a very wide range of territory, but seems to thrive best on low, moist ground, often being covered with water for a short time without any appreciable damage. It is a very nutritious grass,



making hay of fine quality, but not giving a very heavy yield. It ripens a little later than timothy. It grows taller and ranker in the south than in the north. It is a valuable forage crop, and when mixed with timothy makes an excellent quality of hay.

English writers do not recommend its use except on soils where better grasses fail to grow. It has given excellent results as a pasture grass in Northwestern United States. When mature the head has a reddish brown tint which probably gives it its name. Twenty-four to thirty-six pounds of seed are sown per acre.

*Alopecurus pratensis* (Meadow fox-tail).

This is another perennial grass. It was introduced from Europe and is inferior to, but somewhat resembles timothy, ripening about a month earlier. The best results are obtained by sowing it with other grasses because of the relative large amount of foliage to stem. It reaches its best, three to four years from the time of sowing. It comes on early in the spring and bears cropping or mowing often. In England it is one of their best and most highly esteemed native grasses. It requires a rich, moist, heavy soil to give best results. About thirty-four pounds of seed is sown to the acre. It has never been tried extensively in the Northwest, so little is known of it in that region.

The southern stations generally give unfavorable reports on this grass, claiming that the growth which it makes during the mild winter spells unfits it to withstand the summer heat and drouth. It seems well adapted to parts of New England, New York and Canada.

*Anthoxanthum odoratum* (Sweet Vernal Grass).

This is a very slender, erect growing grass from one to two feet in height. The leaves are slightly hairy and the

blade of the upper leaf is only about one inch in length. It has a characteristic sweet odor. It is a perennial, introduced from Europe. It grows well in the shade, and yields fairly well on very poor soils. It does very well when sown in mixtures, but will probably never be of great economical importance in this country.

(To be Continued.)

On the opposite page is a cut of the black Percheron stallion Rameur, imported this summer by McLaughlin Brothers. His pedigree traces, both on his sire's and dam's side, to Jean-le-Blanc, the fountain-head of the breed of Percheron horses. Before importation he won first prize at Nevers, France.

A few days ago the writer visited the stables of McLaughlin Brothers, where he saw fifty such stallions, a large number of which were prize winners in France before they were imported, in evidence of which fact, McLaughlin Brothers have a large number of gold medals.

The firm have already made two importations this season, and in order to accommodate the large number of horses, have doubled the capacity of their stables, which are located between Sixth and Seventh avenues, on Wesley avenue, of this city, where farmers and those interested in good horses are always welcome; for it seems to be the greatest pleasure to the McLaughlins to show their magnificent animals to people who are interested in good horses. Their extensive importing establishment is indeed one of the attractions of Columbus, and no farmer or horseman should fail to visit it while in the city. Their horses go into all parts of the United States, and the magnitude of their business is so great that one of the members of the firm is compelled to spend the greater part of his time in France, where he is enabled thus to buy the best horses.

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Local to Cleveland....	† 4:15pm	† 9:10pm
Southwestern Limited	* 10:00pm	* 7:08am
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Louisville & Nashville	* 2:10am	* 1:30am
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Dayton & Cincinnati..	* 7:15am	* 9:55pm
Ind'napolis & Chicago	* 7:15am	* 9:55pm
Dayton & Cincinnati..	† 8:45am	† 6:30pm
Local to Cincinnati...	† 8:45am	† 6:30pm
Dayton & Cincinnati..	† 12:45pm	† 4:05pm
London & Springfield.	† 12:45pm	† 4:05pm
Dayton & Cincinnati..	* 3:25pm	* 11:35am
Ind'napolis & St. L's..	* 3:25pm	* 11:35am
Louisville & Nashville	* 3:25pm	* 11:35am
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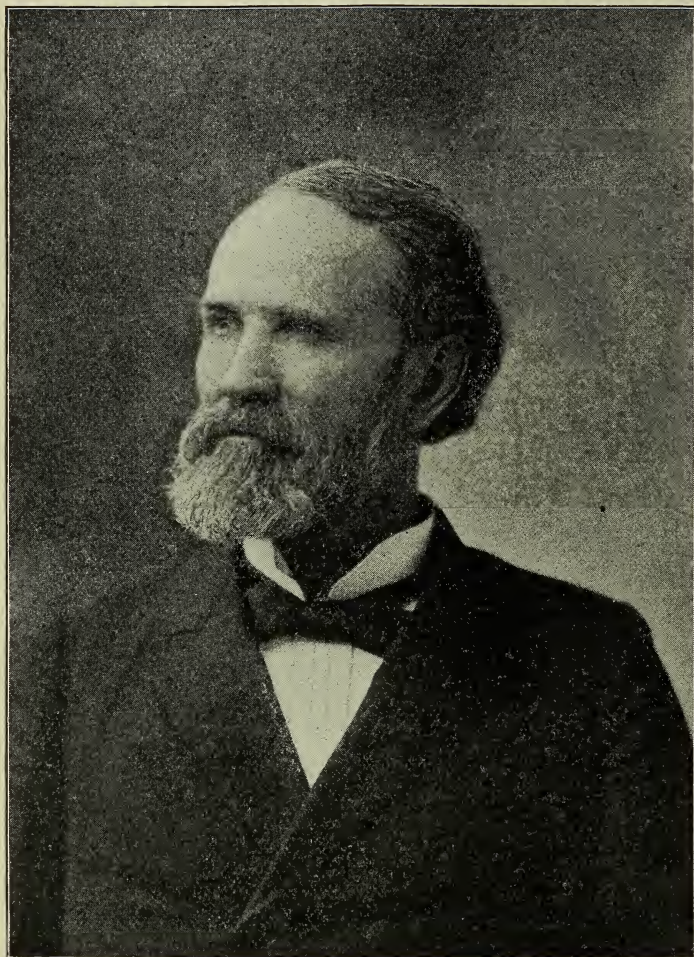
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